

## ALUMINUM HANGER AND HANGER ASSEMBLY

### Technical Field

[0001] This application is a continuation-in-part of U.S. Patent Serial Number 10/194,934, herein incorporated by reference. The present invention relates generally to an aluminum hanger assembly for trailers. More particularly, this invention relates to a lightweight, high-strength, aluminum hanger used in a hanger assembly and attachable to a standard aluminum trailer, which allows for connection of a conventional suspension arm, air spring, and shock absorber.

### Background of the Art

[0002] A wide variety of trailers have been developed for transportation of various goods via roadways. Such trailers include platform trailers, refuse trailers, frame and frameless dump trailers as well as other types. In the various trailer configurations, suspension systems are provided in association with wheels of the trailer to provide a smoother ride and facilitate handling and transportation of loads thereby. As it is desired to maximize the load-carrying capacity of the trailer, the characteristics of the suspension system and mounting arrangement become an important aspect of the trailer design.

[0003] Prior trailers typically use a steel suspension system which includes steel hangers, steel brackets, suspension arm, air spring, and shock absorbers. The suspension arm is attached to the axle and the air spring; steel hangers, and steel brackets are generally attached to one or more central I-beams or a sub-frame foundation over the rear wheels of the trailer. This poses a particular problem for aluminum trailer frames, as the steel hangers cannot be welded directly to

the aluminum frame. To overcome the problem, trailer manufacturers have added a steel attachment plate to the top of the steel hanger and a mating aluminum base plate on the bottom frame of the trailer. The steel attachment plate is then bolted to the aluminum base plate. However, substantial problems still exist. The steel suspensions and additional steel and aluminum attachment plates add a significant amount of weight to the trailer. The steel suspensions are subject to rust, and the dissimilar metal of the steel adjacent the aluminum can result in galvanic corrosion.

[0004] In the past, trailers had been manufactured using plates of aluminum sheet welded together and reinforced with reinforcing ribs. Now, some trailers are being manufactured using high strength extruded aluminum plate such as 6061. The extruded aluminum provides great advantages in terms of strength while eliminating much of the need for reinforcing ribs along the trailer body. However, the strength and durability required for many of the subframe and suspension components have substantially prevented the use of aluminum on either a subframe or suspension assembly. Prior art attempts to incorporate aluminum suspension components have either been too complex or too weak to be of any commercial benefit or success. In addition, there has been no option available to retrofit existing aluminum trailers with an aluminum hanger system. Accordingly, these material advantages have not been utilized in the structural components such as the suspension.

[0005] It would, therefore, be desirable to provide an aluminum hanger and hanger assembly which has the desired strength characteristics, while being of reduced weight, and which allows for various suspension systems to be integrated into the trailer construction in a simplified

manner. It would also be desirable to provide an aluminum hanger assembly for mounting on existing aluminum trailers designed for or having steel hangers.

#### Summary of the Present Invention

[0006] It is, therefore, an object of the present invention to provide a lightweight, high strength, aluminum hanger and hanger assembly that significantly reduces the weight of the trailer without diminishing the strength as compared to conventional trailers and is compatible with conventional air ride suspension systems. At least one of these advantages are provided by a trailer hanger assembly comprising a pair of hangers, each hanger comprising a swing arm attachment portion comprising an outboard wall, an inboard wall generally perpendicular to the outboard wall, a pair of trailer attachment plates, each attachment plate attached to one of the pair of hangers; and a transverse support member having a first end attached to the outboard wall of one of the pair of hangers and a second end attached to the outboard wall of the remaining hanger of the pair of hangers; wherein the trailer hanger assembly is made of aluminum.

[0007] The invention is also directed to a method for making an aluminum hanger assembly for a trailer comprising the steps of: providing a pair of hangers, each hanger comprising a monolithic body formed from extruded aluminum, each body comprising a swing arm attachment portion and a shock absorber attachment bracket portion; attaching a trailer attachment plate to each hanger; providing a transverse support member having a first end and a second end; and attaching one of the pair of hangers to a first end of the transverse support member and attaching the remaining hanger to the second end of the transverse support member.

Brief Description of the Drawings

[0008] A better understanding of the present invention will be had when reference is made to the accompanying drawings, wherein identical parts are identified with identical reference numerals, and wherein:

[0009] FIG. 1 is a top plan view of a hanger of the present invention;

[0010] FIG. 2 is an interior side elevational view of the hanger of FIG. 1;

[0011] FIG. 3 is a front view of the hanger of FIG. 1;

[0012] FIG. 4 is a bottom and bracket side perspective view of the hanger assembly of the present invention;

[0013] FIG. 5 is a top perspective view of the hanger assembly of FIG. 4;

[0014] FIG. 6 is a bottom and closed hanger side perspective view of the hanger assembly of FIG. 4;

[0015] FIG. 7 is an end perspective view of the attachment of the hanger assembly of FIG. 4;

[0016] FIG. 8 is a perspective view of the hanger assembly of the present invention bolted and welded to the bottom of a trailer frame showing the attached air suspension components; and

[0017] FIG. 9 is a perspective view of a hanger of the hanger assembly of the present invention bolted to the frame of a trailer.

Detailed Description of the Drawings

[0018] Aluminum hangers and aluminum hanger assemblies have been previously described

in co-owned, pending application U.S. Patent Serial Number 10/194,934, herein incorporated by reference. However, the former application was primarily focused on an aluminum hanger and aluminum suspension manufactured into the aluminum trailer as part of the subframe or as part of the frameless trailer. However, the previously disclosed aluminum suspension was not readily usable as an aluminum hanger assembly for mounting on existing aluminum trailers designed for or having steel hangers.

[0019] Referring now to FIGS. 1-3, a hanger **20** of the present invention is shown in various views. The hanger **20** comprises a swing arm attachment portion **30** and a shock absorber attachment bracket portion **40**. The swing arm attachment portion **30** comprises a first wall **32**, also referred to as the exterior or outboard wall, a second wall **34**, also referred to as the interior or inboard wall, and a third wall **36**, also referred to as the back wall, connecting and generally perpendicular to the exterior wall **32** and interior wall **34**. The exterior wall **32** and interior wall **34** are formed with a pair of spaced-apart cross-sectional portions **38** that are substantially thicker than the remaining hanger walls. An aperture **22** is formed in the exterior wall **32** and interior wall **34** between portions **38** for attachment of the swing arm (not shown). The shock absorber attachment bracket portion **40** has a first wall **42** formed by a portion of the interior wall **34**, a second wall **44** generally parallel to the first wall **42**, and a third wall **46** connects the first and second walls **42, 44**. An aperture **46** is formed in the first wall **42** and the second wall **44** for attachment of the shock absorber (not shown). The hanger **20** may be manufactured as an aluminum extruded tube and machined to its final dimensions. The extrusion of the tube may be net formed (formed close or at final thickness dimensions) to reduce final machining

requirements.

[0020] Referring to FIGS. 4-7, a hanger assembly **50** of the present invention is shown. Hanger assembly **50** comprises a pair of hangers **20A, 20B**, a pair of trailer attachment plates **60A, 60B**, and a transverse support member **70**. The transverse support member **70** may be a U-shaped channel or other rigid structure. The transverse support member **70** has a first end **72** attached to the exterior wall **32A** of the first hanger **20A** and a second end **74** attached to the exterior wall **32B** of the second hanger **20B**. The hanger **20A, 20B** may be attached to the transverse support member **70** by welding adjacent interface surfaces including the shock absorber attachment bracket portion **40** and the walls **32, 34, 36** of the swing arm attachment portion **30** as shown. The transverse support member **70**, by extending generally the entire span of the hanger assembly **50**, provides a significant improvement in the strength and durability of the hanger assembly **50**. The transverse support member **70** may further comprise one or more apertures **76, 78** along the bottom of the member in low stress areas to allow for water drainage. The transverse support member **70** may be made of a single piece of aluminum plate that is bent to shape, extruded as a U-shape, or formed by welding aluminum plate.

[0021] The pair of trailer attachment plates **60A, 60B**, are generally flat plates having a plurality of apertures **62** therethrough. The trailer attachment plates **60A, 60B**, are attached to the top of the hangers **20A, 20B** and are also attached to the transverse support member **70**. These attachments may be made by welding adjacent interface surfaces as shown. The trailer attachment plates **60A, 60B**, comprise a generally flat attachment surface **64** that mates flat against a frame member of a trailer (not shown). The trailer attachment plates **60A, 60B** may

further comprise a flange **66** extending from one or both ends of the attachment surface **64**. The trailer attachment plates **60A**, **60B** may further comprise a flange **66** extending from the non attachment side of the attachment plates **60A**, **60B**. The flanges **66** provide additional strength to the hanger assembly **50** and may be formed as aluminum extrusions or aluminum plate.

[0022] Hanger assembly **50** may also comprise one or more gussets **80** such as the gussets **80** shown positioned adjacent the hangers **20A**, **20B** and the transverse support member **70**. The hanger assembly may also include cross support members **82** as shown in FIG. 5. Cross support members **82** are attached to support member **70** and may extend beyond the trailer attachment plates **60A**, **60B** as does the support member **70**. Cross support members **82** may also be attached to the attachment plates **60A**, **60B**. The cross support members **82** provide additional strength to the hanger assembly **50**.

[0023] FIG. 8 shows the hanger assembly **50** attached to the bottom of an aluminum trailer **100** showing an attached swing arm **110**, air spring **120**, axle assembly **122**, a brake housing **128** exposed on one end of the axle **122**, and tire/wheel assemblies **126** attached to the other end. The hanger assembly **50** is attached to the longitudinal beam **102** (or to an aluminum plate attached to the trailer for the purposes of attaching a steel suspension) of a trailer **100** with a plurality of fasteners **104** in the form of bolts, and attached to the bottom **106** of the trailer **100** by welds **108**.

[0024] Referring now to FIG. 9, a hanger assembly **50** is also shown attached to the bottom of an aluminum trailer **100** showing an attached swing arm **110** and shock absorber **124**. The swing arm **110** is adjustably attached to hanger **20** by a fastener **112** eccentrically positioned in circular adjustment disk **114** as well known in the art. Disk **114** is captured between spaced-

apart portions **38** of the hanger **20**. These integral spaced-apart portions **38** not only provide increased strength in the hanger **20** and hanger assembly **50**, but also provide adjustability of the swing arm **110** without requiring additional parts to be welded to the hanger **20**.

[0025] The present invention takes advantage of new developments in aluminum material technology to utilize a lower weight, high strength aluminum product to replace steel structural elements typically used in prior art trailers. Examples of the preferred types of aluminum alloys include 6000 series aluminum and 5454 plate; however, any suitable aluminum alloy can be used, as the present invention is not limited to the recited alloys. The higher strength aluminum enables the weight savings of approximately 400 pounds in one trailer configuration, as compared to a conventional steel subframe and steel suspension. The invention may be used with different trailer types and on trailers constructed of different materials, such as aluminum or composite. The present invention also provides a unique monolithic hanger having an integral shock absorber attachment bracket which is made as an aluminum extrusion. Additionally, the present invention provides a unique method for making an aluminum hanger assembly that can be easily bolted on and welded to existing frameless aluminum trailers and other aluminum trailers that are currently designed for use with steel hangers.

[0026] Although the present invention has been described above in detail, the same is by way of illustration and example only and is not to be taken as a limitation on the present invention. Accordingly, the scope and content of the present invention are to be defined only by the terms of the appended claims.